

Last DSM Algorithm  
Minimum Bias and Central Research

6<sup>th</sup> December 2003

Input Bits

Input Channel	Bit Description
0	CTB Multiplicity Bits 0:15 – Multiplicity
1	VTX Information Bit 0 – BBC TAC difference in window Bit 1 – ZDC TAC difference in window Bit 2 – BBC East small-tile ADC sum over threshold Bit 3 – BBC West small-tile ADC sum over threshold Bits 4:5 – Unused Bit 6 – ZDC East ADC sum over threshold Bit 7 – ZDC West ADC sum over threshold Bit 8 – ZDC East TAC in window Bit 9 – ZDC West TAC in window Bit 10 – ZDC East+West attenuated sum over threshold Bits 11:15 - Unused
2	Unused
3	Unused
4	Miscellaneous Information Bit 0 – Blue bunch filled Bit 1 – Yellow bunch filled Bits 2:15 - Unused
5	Unused
6	Special Trigger Requests Bits 0:2 – selected special trigger request (zero if no request) Bits 3:6 – detector number (0:15) of detector making request Bits 7:13 – Unused Bit 14 – Zero-bias bit Bit 15 – Random bit
7	Unused

Registers

Register	Register Description
0	16-bit low threshold for the CTB Multiplicity
1	16-bit medium threshold for the CTB Multiplicity
2	16-bit high threshold for the CTB Multiplicity

Output Bits

Bit	Description
Bits 0:14	If Bit 15 = 1 – Special Trigger Requests Bits 0:2 – Special Trigger request

	Bits 3:6 – Special Trigger detector Bit 7 – Random bit Bits 8:15 – Unused Else – Physics Data Bit 0 – CTB multiplicity over low threshold (Reg. 0) Bit 1 – CTB multiplicity over medium threshold (Reg. 1) Bit 2 – CTB multiplicity over high threshold (Reg. 2) Bit 3 – BBC TAC difference in window Bit 4 – ZDC TAC difference in window Bit 5 – BBC East small-tile ADC sum over threshold Bit 6 – BBC West small-tile ADC sum over threshold Bit 7 – ZDC East ADC sum over threshold Bit 8 – ZDC West ADC sum over threshold Bit 9 – ZDC East TAC in window Bit 10 – ZDC West TAC in window Bit 11 – ZDC East+West attenuated sum over threshold Bit 12 – Zero-bias bit Bit 13 – Blue bunch filled Bit 14 – Yellow bunch filled
Bit 15	Flag indicating meaning of bits 0:14
Bits 16:30	Same definitions as bits 0:14 in the case where bit 15 = 0, i.e. these bits are always Physics Data, never Special Trigger Requests.
Bit 31	Unused

#### Internal Logic

- The CTB multiplicity is compared to three thresholds whose values are set during RUN configuration (Regs. 0, 1 and 2)
- A decision is made to pass Physics Data or a Special Trigger Request to the TCU.
  1. The 3 bits of the special trigger request and the random bit are OR'ed together
  2. If ANY of these bits is "1" then output bit 15 will be 1, and the special trigger request and the random bit will be passed to the TCU.
  3. If NONE of these bits is "1" then output bit 15 will be 0 and any physics data will be passed to the TCU.